AMERICAN

# RAILROAD JOURNAL,

AND

# MECHANICS' MAGAZINE.

Published Monthly at 23 Chambers-st. New York, at $2 a-year, in advance, or 3 copies for $5. | By GEO. C. SCHAEFFER, and D. K. MINOR, Editors.

No. 9, Vol. I. Third Series. | SEPTEMBER, 1843. | Whole No. 428. Vol. XVI.

The South Carolina canal and railroad company being hereafter merged in the Louisville, Charleston and Cincinnati railroad company, the present report is intended to give a general view of the affairs from the first organization of the corporation. A highly interesting history of the undertaking we have already extracted in a previous number.

This report by Mr. Tristram Tupper, late President, shows that great advances have been made in economy and good management, and throughout the zeal and faithfulness of this gentleman to his duties are well displayed.

But while admiring the industry with which the materials of the report have been collected we cannot but regret that the truth of certain statements in the preface had not been more fully investigated before publication. In endeavoring to exalt the value of the stock passing into the hands of the Louisville Cincinnati and Charleston railroad company, Mr. Tupper takes the opportunity of stating that the stocks of but *four* railroads in the United States are above par, while all others are *at*, or far below par. The statement is not only literally untrue, but is calculated to produce a bad effect upon this species of investment. We have no doubt that such a result was far from the mind of the writer, but still he should have been careful not to decry all other works in praising his own.

REPORT.

*To the Stockholders of the South Carolina Canal and Railroad Company:*

In accordance with the general usage of this company, and in conformity with one of its rules, a statement of its affairs, as made up by the secretary and treasurer, is herewith presented, showing the gross income of the half year, ending the 31st December, 1842, to be $182,678 05

And the expenditure for the same time, for improvement and repairs, 110,085 22

Leaving a nett income of $72,592 83

Being over the rate of 7¼ per cent. on the capital of $2,000,000; and showing a gain over the same months of last year, $28,519 89

In larger receipts, $18,929 22

And smaller expenditure, 9,590 67

This encouraging result has been presented in each of our semi-annual reports for the last three half years, exhibiting a gradual improvement in the

condition of the company; and it will be our duty to show in the present report, how our contracts and engagements might have been made to produce the company a much larger nett income, without materially affecting its general arrangements.

Since the 1st of July, the company have reduced its indebtedness $72,592 83.

| | |
|---|---|
| From amount then due, | $212,675 88 |
| To amount now due, | 140,083 05 |

The only remaining debt of the company, (except for incidental expenses for which we have cash in hand,) is $100,000 to the State of South Carolina, with interest, $53,253, payable in 1847.

The accounts thus show a surplus of over $13,000, from which a dividend might be safely made of one-half per cent., but we believe it more advisable to retain it until July, when a full dividend of at least 3½ per cent. can be made.

Since the 30th June, 1839, the balance due by this company, over its assets, have been reduced from the nett income, $355,121 57

| | |
|---|---|
| The amount at that time, | $495,159 62 |
| And at this time, | 140,038 05 |

embracing the amount borrowed from the Louisville, Cincinnati and Charleston railroad company, to complete the improvements of our road to that date, $332,182 10

With interest since credited, 39,914 14

Making amount paid that company in full, $372,096 24

This fund would have paid dividends to the amount of 18 $\frac{6}{10}$ per cent., if not applied to the payment of debts, or about 5½ per cent. per annum, during a period of the most depressed state of trade, perhaps ever known.

And whatever may be the state of trade for the future, it is believed that the low amount to which the expenses of our road is reduced, (compared with former years,) will enable it to produce a handsome profit to the stockholders.

In my July report, it was stated that "the current half year will, no doubt, on both roads, furnish a nett income of not far from $100,000." It appears that the amount realized is $101,600 37. It was also stated, that at least 60 setts of chilled wheels and axles, with steel journals and chilled boxes, would be made in the work shops during the ensuing six months, and that the platform cars would be increased to 30 on eight wheels--63 setts of the wheels have been cast and fitted to axles, and the 30 platform cars completed, which aid much in the transportation of cotton.

The report of the superintendant of the road, (Mr. Lythgoe,) will show the progress and improvement of his department—and by the contracts he has made for the ensuing year, the amount of wages will be further reduced, notwithstanding there has been to this time a gradual reduction for the last six years in this item of our expenses.

There is strong reason to believe that the effort made to preserve the timber for repairing the road, by Earleizing it, will contribute much in lessening the consumption of this article, which is now less than half the amount used four years ago.

About four miles of road, at different points, have been laid with this prepared timber, besides several turnouts, without any additional expense in the road department; as we stated in our last report, the inferior sap-timber used is obtained for enough less than the heart-timber, to defray the expense of Earleizing—and so soon as the test going on in Sixth street, Philadelphia, (of inferior hemlock laid down in 1839,) is rendered sufficiently satisfactory

to warrant it, the whole road could be relaid with mineralized timber as fast as that now in the road is required to be removed, which may be done with diminished expenditure each successive year.

The report of the master of machinery shows the condition of that department, and the progress of improvement there; the economy in the work shops, for the last two years, is particularly interesting, and should be very gratifying to all who have a knowledge of it. We have in many things surpassed all similar establishments; our success in making such machinery as is required, particularly wheels, axles and boxes, and preserving them from wear while running, has exceeded all precedent, and will be a saving to the company of at least twenty thousand dollars per year in the machinery department.

Since the 1st of July, we have had cast 254 chilled wheels of the same quality commenced twenty-two months since, of which not one has yet failed, which, with the axles, having steeled journals, and chilled boxes, cost but one-half the price of any ever obtained from abroad; these are also used in the place of, and are much more durable than the wheels with wrought iron tires fitted with brass boxes, which have cost more than four times as much as these made here, of *condemned materials.* Their being fitted for the use of tallow, instead of oil, is a saving of nearly the whole cost of the latter, which, when used on the train, was applied every ten miles run, while with the new arrangement, where the boxes are well fitted, (after the first few trips, which wear the parts smooth,) there is little or no consumption of the tallow. In fact, the passenger trains, which have been particularly watched to ascertain the result, have not consumed as large an amount in tallow in twelve months as formerlly was applied in oil in two trips. Oil is now only used in the work shops, and on such parts of the engines and cars as are not fitted for tallow.

The cost of oil and tallow purchased annually has been reduced from $6,500 worth in 1837 to $2,000 in the last year, and the number of trips much increased since the former period.

The engines built in our shops are more simply constructed, and consequently require less repairs than any we have had from Europe or the northern States. There is one now nearly finished, which, it is believed, will be capable of a greater performance than any one now on the road.

The position of our shops has given the master of machinery a greater opportunity to improve upon the locomotive engine, than perhaps any other machinist. Having been at the end of one of the longest roads a greater length of time, where he has seen every engine go out and come in, and obliged to correct their defects, and cannot have avoided discovering any disproportion of their parts, or any unsuitableness of the materials used in their construction, and must have acquired the best mode of adjusting and renewing these imperfections.

These views will be fully confirmed by reference to the general statement, showing the expenditure for the last seven years, where it will be seen that the annual cost of machinery and materials have been reduced since 1837 from about $90,000 in that year to $22,250
A saving in this department of $67,750
with only $6,000 increase of the work shop wages, when it must be recollected that the former year commenced with as great a number of engines as the last.

The extent of our work shops, although the buildings are inferior, and the perfection of the preparations there for carrying on the work, is producing an immense saving to the company, and these works are daily improv-

ing by setting up additional apparatus and machinery for facilitating the business of building and repairing engines and cars.

This economy has gone through the whole business of the company, as will be seen by the same general statement.

The aggregate of all the items of expenditure, except land, new iron and embankment, in the year 1837, was about $377,000
and the same items in 1842, 225,700
Showing this difference $151,300
in favor of the last year, with nearly double the business on the road.

This will be more satisfactorily explained by another statement, giving the cost of the miles run each year.

In 1837, 172,456 miles—$377,148 54 expenditure; 82 12½ cost per mile.

In 1842, 299,744 miles—$225,742 62 expenditure; 72 cents cost per mile.

It is proper here to admit that this great difference is not all obtained by economy, a considerable part of it is from the fact that many of the articles used are now purchased at a much lower price than formerly, and some part of the outlay in 1837, was for improvements not requiring to be repeated each year. These we will assume would have amounted to $50,000, or one-third the difference stated above. Such is the present condition of the property belonging to the South Carolina canal and railroad company, that it is now fully worth its cost to the Louisville, Cincinnati and Charleston railroad company, $125 per share, and including interest since purchased, $150 per share—and by allowing the purchasers of the stock to assume the debts of the Louisville Cincinnati and Charleston railroad company in part payment, for which this stock is liable, believe it might be disposed of at the above rate—or the whole property in the name of the South Carolina canal and roailroad company might be leased or "farmed out," agreeably to the provisions in the charter, (by giving all its privileges,) at the rate of ten per cent. per annum on the capital of two millions, for ten years, payable monthly in advance. The property to be preserved in its present good condition, and the transportation on the Columbia road, performed and charged at the same rate per mile that it should cost on the main road. The lessee to have the right, and be required to pay the interest on the debt of the Louisville, Cincinnati and Charleston railroad company, on account of the rent, as it is required by an act of the legislature, that the interest on the Sterling bonds be paid from the income of the South Carolina canal and railroad company.

---

More than a year since our attention was excited by the excavating machine employed at Fort Green, Brooklyn. We paid it several visits, and were highly gratified with its performance, but from not knowing who the proprietors were, we were unable to afford any satisfactory information as to the details of the machinery, or the cost of operating it. We at last found a very good and tolerably complete notice which was published in the number for March, 1842, p. 177.

The following description, together with an account of previous patents, for similar purposes, is from the London Journal of Arts and Sciences. We are indebted to Messrs. Eastwick & Harrison for the English cut which accompanied this article.

It must be recollected that this is the first excavating machine which has

ever gone into successful operation—in this country at least. Much interest is felt in it, and we have heard many inquiries in regard to the cost of working, and the circumstances of ground favorable for its use. From the want of notice on the part of the proprietors, we have never succeeded in obtaining this, though we have at times taken much pains to gather the desired information. Their own advantage should prompt them to give publicity to everything concerning the machine.

MACHINERY FOR EXCAVATING, OR CUTTING, AND REMOVING EARTH.

Many have been the attempts to supersede, by means of machinery, the use of hand labor in the tedious and laborious operations of cutting and removing earth, for leveling inequalities of the surface, forming canals and docks, and clearing the beds of rivers. These mechanical contrivances have necessarily partaken of the same general features, viz., moving peckers and shovels, or scoops, constructed and arranged in various ways, and actuated by wheels and levers, in a variety of forms and combinations, from the simple and well known dredging apparatus, commonly worked in our harbors and rivers, to the elaborate and gigantic new American excavator, which, under the absurd cognomen of the "Yankee Geologist," has been proclaimed to the world as capable of removing mountains.

Without intending, in the slightest degree, to detract from the merits of this American invention, which we hear from disinterested parties, who have witnessed its performance, to be one of paramount importance and vast capability, we think it necessary, in order to qualify the extravagant statements given in some of the periodicals of the day, both foreign and English, respecting its astonishing powers, to state what are the leading points on which its claims to novelty are founded.

In order to show this more clearly, it will be desirable to mention, in a brief way, the objects and features of the several machines for excavating and removing earth, which have been the subjects of patents within the last twenty years. The first of these we find to be the invention of George V. Palmer, of Worcester—a machine to cut and excavate earth, granted 8th June, 1830. This machine is mounted upon wheels, intended to advance upon a temporary railway, laid upon the surface where the excavation is to be made, beneath which a hole is dug to commence the operations in. There are a number of peckers in front of the machine, which by vibratory action, dig into, and thereby break up the earth. A consecutive series of buckets, connected by an endless chain, are brought down into the disturbed and broken ground, and scrape up the soil, stones, etc., which are carried away up an inclined plane, in the manner of the ordinary dredging apparatus. The machinery is worked by a winch and toothed gear, and advances upon its railway as the earth is broken and removed.—See vol. vii, page 314, of our second series.

Mr. G. V. Palmer, of Worcester, had a second patent granted, 24th January, 1832, for improvements in machinery or apparatus for excavating, and which he called an excavating and self-loading cart. This contrivance much resembled an ordinary cart upon two wheels, drawn by horses. Under the cart were placed the cutting, or excavating, instruments, formed something like the share and breast of a plough, which excavators were capable of being lowered, so as to take into the ground and break up the soil to any required depth, as it advanced; or they might be drawn up out of operation, in order to allow of the cart travelling on ordinary roads, when proceeding to, or returning from, its work. The running wheels of the cart were broad,

and their felloes hollow, and in these hollows were transverse partitions, formed by plates, which constituted the bucket wheels. On the cart advancing, the ploughs, or cutters, penetrated into and broke up the ground, and turned the soil sideways into the buckets of the running wheels, which, as they revolved, raised the soil, and, in turning over, let it fall on to inclined edges, by which it was conducted into the cart.—See vol. i, page 278, conjoined series.

In December, 1833, a patent was granted to Mr. Thos. Affleck, of Dumfries, for his invention of improvements in the means and machinery for deepening and excavating the beds of rivers, removing sand banks, bars and other obstructions to navigation. This, however, consisted merely of apparatus, which, when agitated by the rolling waves, or rise and fall of rivers, disturbed and broke up the mud, sand or gravel, for the purpose of enabling it to be washed away by strong currents, or freshets.—See vol. iv, page 273, conjoined series.

An apparatus to facilitate and improve the excavation of ground, and the formation of embankments, invented by Mr. William Brunton, engineer, of London, was made the subject of a patent, dated 2d November, 1838. A part of this invention was a series of hook-shaped cutters, fixed in a frame, one in advance of another, and which, being connected to machinery, were forcibly projected into the ground, and made to plough it up in grooves; each cutter, as it advanced, cutting and preparing the way for the next cutter in succession. The other parts of the invention applied to the arrangement of stages, and the order in which a series of workmen were to dig and remove the soil. Also, the manner of depositing soil for the formation of embankments; compressing it to give solidity; and conducting the earth-wagons, upon tram-ways, by endless ropes.—See vol. xvii, p. 284, conjoined series.

Mons. L. J. A. Ramel, a foreigner, obtained a patent in England, dated 19th March, 1838, for his invention of improvements in machinery for excavating and embanking earth, for the construction of railways, and other works. The specification of this patent does not set out in very clear terms what are the features of novelty proposed, but speaks of the "system of a lever." As far as we can understand the subject, it seems to be merely the adaptation of a long lever as a crane, which works vertically, to raise loads of earth in a box, in place of employing hand barrows, passing up inclined planes, or of pitching the earth from stage to stage by hand-labor. This lever is mounted upon a platform, with running wheels, for the convenience of passing it from place to place, upon a railway; and the lever, to one end of which the loaded box is attached, is worked by a cord, or chain, connected to the other end, and to a winding drum, or barrel, and windlass; and when the load of soil is conducted to the place of deposite, it is let fall into a cart, by opening the bottom of the box.

An invention of certain improved machinery for cutting and removing earth, was communicated to Mr. William Newton, of Chancery Lane, by a foreigner, for the purpose of obtaining a patent, which was granted on the 27th March, 1839. This invention is a peculiar arrangement and construction of apparatus, mounted in a carriage upon a temporary railway, in which a series of rotary cutters, or peckers, working in inclined positions, are made to break the ground below, at an angle of about forty-five degrees, as the carriage proceeds; and also to throw the earth, thus broken, into a consecutive series of buckets, attached to an endless chain, which, by travelling vertically, takes up the broken earth to the top of the excavation, and delivers it into a series of troughs above, which troughs, by moving in a transverse

direction, carry away the earth and deposite it in carts, or otherwise, as convenience may require.—See vol. xvi, page 57, conjoined series.

Mr. W. Scamp, of Woolwich, obtained a patent, dated February, 1841, for an application of machinery to steam vessels, for the removal of sand, mud, soil and other matters, from the sea, rivers, docks, harbors and other bodies of water. This invention consists merely of a barrel, studded all over with spikes, which, being mounted upon an axle, was suspended by lever arms from the vessel, and, on being lowered down to the bed, or bottom of the river, the barrel was made to revolve, as the vessel advanced, by a travelling endless chain, extending from a pulley, or spur wheel, on the axle of the propelling wheels; or, by other rotary means, to a pulley on the axle of the barrel, so as to cause the mud, sand, and other materials on the bottom, to be disturbed, or broken up, by the spikes, and on mixing with the water, to be carried away by the current.

These are all the schemes which have been proposed and brought before the public, under the protection of letters patent in England, within the last twenty years, until the introduction of the American invention above alluded to.

This machine, which we are not permitted at present to lay before our readers in all its details, consists of a horizontal platform, mounted upon wheels, carrying a strong jib-crane, and also a steam engine. From the end of this jib-crane, the excavating tool, or cutter, is suspended by chains and pulleys, which allow of its swinging in a forward direction; and the back part of the tool, or cutter, is attached to a rod, or beam, sliding on rollers, which being acted upon by chains and toothed wheels, in communication with the steam engine, causes the cutter to be projected, with great force, against the earth required to be broken up.

The mechanism and the suspending chains, connected with the steam engine, and with the projecting rod, or beam, affords the means of regulating and determining the course in which the cutting tool shall move forward; and by means of a small hand lever, a workman, standing upon the platform, is enabled to direct the advancing cutter through the ground, in a horizontal line, or through any inclined or curved course, up to a perpendicular; the movements of the pendulous chains determining the course of the cutter, while the sliding beam projects it forward.

The excavating tool is formed as a scoop, with strong tangs, or teeth, in front, to break the earth as it enters, and a sharp cutting edge to take up the broken fragments.

The machine having been moved upon its railway to the place where it is required to excavate, the platform is then made fast, pro tem., in that situation, and the steam power of the engine brought to act upon the mechanism, by sliding clutches, or other contrivances. The pendant tool, or excavator, is then forced forward by chains, connected to the projecting beam, and passed round a rotary drum, driven by gear from the engine; and at the same time, the pendant chain is drawn up, or let out, as may be necessary, to allow the excavator to advance in the required course. When the projecting beam has carried the excavating tool forward to its extent of action, in a horizontal cut, the suspending chain, from the crane-jib, will raise the loaded scoop, (or the projecting and raising of the scoop may be simultaneous, as the workmen shall direct,) which loaded scoop when brought to its highest position, may be conducted to one side of the excavation by the swinging jib, and the contents let fall into a cart, by opening the back of the scoop; all which operations are effected through the agency and power of the steam engine, under the direction and regulating hand of the workman.

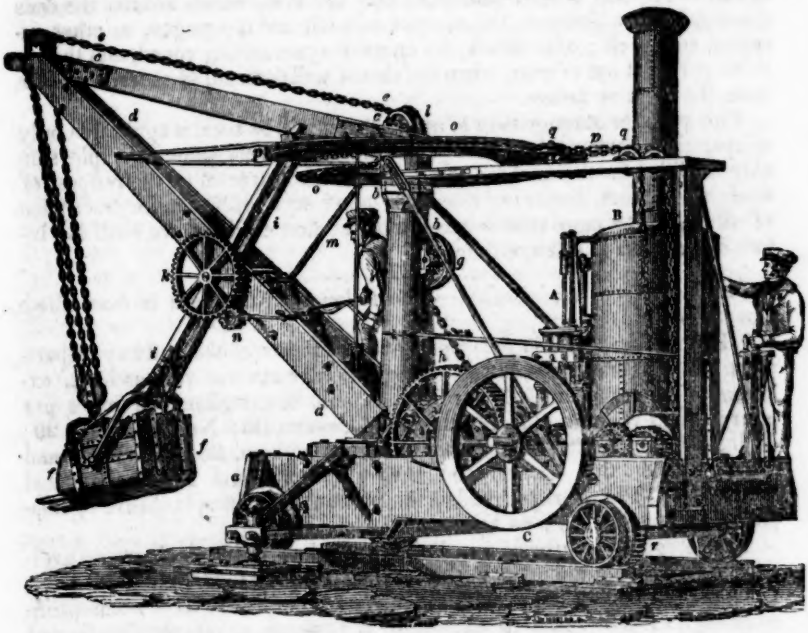
It is only necessary further to say, that by turning the jib of the crane to the right or left, the cutting of the earth may be performed at any angle to the direction of the machine, and, consequently, to a very considerable extent—viz., a circuit of forty or fifty feet—without shifting its situation; but when a change of place becomes necessary, the fastenings by which the platform was secured must be withdrawn, and the power of the steam applied to move the whole, upon its turning wheels, to the next place where it may be required to be made stationary.

Having given this brief description of the construction and mode of working the new American excavating machine, we conclude our present report by stating the points of novelty which it may fairly claim over others that have preceded it. Firstly, it is locomotive; its movements, and all its operative parts, deriving their powers from the steam engine which it carries. Secondly, that the earth is broken up and carried away from the place excavated by one instrument, (the scoop,) acting with immense effect, through the power and agency of steam. Thirdly, that the cutting may be made with equal facility at any inclination to the horizon, and to a great extent around the spot on which it is stationed, by the direction of the workman, without requiring to be moved from its place. Fourthly, that, by this machine, a channel may be cut through a hill, with the proper slopes for its sides, and a level base correctly formed, the excavated earth being simultaneously removed. Fifthly, the capability of cutting many feet below the base on which the machine runs, by lengthening its chains and guide-beam; which last feature renders it also applicable to working under water, when placed in a vessel, for removing sand banks, bars and beds of mud.

The engine and boiler, by which the various parts of the machine are put in operation, are shown at A B—*a a* is the framework, provided with wheels, by means of which the whole apparatus is capable of being moved along a temporary railway, as the machine digs away and removes the earth before it. The crane-post is shown at *b b*, at the upper end of which is placed the crane-jib *c c*, supported by the diagonal beam *d d*, which is also used for carrying certain wheel work and apparatus for effecting the required movements of the shovel. At each end of the crane are mounted pullies, over which a chain *e e*, passes from the shovel, or excavator *f*, and from thence down the centre of the crane-post, and under the carrier-pulley *g*, to a windlass, or capstan, on the axis of which is mounted a large toothed wheel *h*, taking into a pinion upon the main driving-shaft, on which is mounted the fly-wheel C. The shovel, or excavator, is connected by swing-joints to the forked end of diagonal arms *i i*, which are furnished with chains, attached to each end thereof. These chains pass once round pullies, mounted upon the axle of the toothed wheel *k;* and hence, on rotary motion being communicated to the said axle, the diagonal arms *i i*, and consequently the shovel *f*, will be caused to move upwards or downwards. The end of the shovel is connected by hinges to the other parts thereof, and retained in its proper position, during the operation of digging, by means of a bolt, or pin, which may be withdrawn, by means of suitable apparatus, when the filled shovel is raised by the chain *e e*, and swung round to the required position; the shovel will then tilt over, depositing the excavated earth in a wagon, or other required receptacle.

Upon the axle of the guide-pulley, on the top of the crane-post, is a beveled toothed wheel *l*, taking into a similar wheel, mounted upon a diagonal shaft *m*, at the lower end of which is a beveled pinion, taking into another, mounted upon the axle of a pinion *n*, which latter pinion is capable, by means of hand-levers, of being shifted in and out of geer with the wheel *k;* by

which arrangement, the chain *e*, passing over the guide-pulley, and communicating rotary motion thereto, will cause the pinion *l*, and shaft *m*, to revolve, and thereby, through the intervention of the pinion *n*, and wheel *k*, effect the required motion of the diagonal arms *i i*, and shovel *f*, the attendant being able to arrest the motion thereof, at any time, by means of the hand-levers connected to the pinion *n*.



The horizontal motion, or swinging round, of the crane is effected by means of the horse-shoe shaped pulley *o o*, affixed to the crane by cross-rods; to this pulley each end of a chain *p p*, is fastened, which chain, having passed round the periphery thereof, is conducted downwards, by means of guide-pullies, *q q*, passing once around an axle, driven by wheel-work, connected to the engine, which wheel-work is capable of being shifted in and out of gear with the main shaft, by the attendant, through the intervention of a hand-lever; by this arrangement, the chain *p p*, is put into motion at discretion, thereby causing the horse-shoe pulley *o o*, to revolve, and with it, the crane and shovel, or excavator. The machine is propelled along its temporary railway, as the work progresses, by means of a toothed wheel *r*, affixed on the axle of one pair of running-wheels, and connected to the motion of the engine by suitable gearing.

When the operation of excavation commences, the shovel is caused, (by the loosening of the chain *e e*,) to assume a nearly perpendicular position, the teeth thereof being turned towards the earth; motion then being communicated to the several parts, by means of their respective trains of wheel-work, the chain *e e* is gradually drawn tight, and wound around the capstan or windlass; during which operation the arms *i i* are brought into action, forcing the shovel into the ground by the means before described; hence it will be perceived that the shovel, or excavator, is operated upon by power exerted in two directions, the one through the medium of the arms *i i*, caus-

ing it to be thrust into the earth, the other through the medium of the chain *e e*, and its appendages, causing it to be lifted therefrom; by which combined action, and suitable speeds of driving gear, the shovel will describe a curve in ascending, the commencement thereof, being just in front of the machine, and the end thereof vertically under the front of the crane-jib. The shovel being filled with earth, and raised to this point, is swung round, by means of the horse-shoe shaped pulley *o;* and the bolt, which secures the ends thereof, being withdrawn, the contents will fall into the wagon, or other required receptacle; after which, the crane is again swung round, and the various parts put out of gear, when the shovel will descend, in order to operate upon the earth as before.

This peculiar arrangement of apparatus, it will be seen, is applicable only to operations performed on land; but a machine on the same principle, suitably modified for the intended work, has been constructed for the purpose of dredging harbors, deepening rivers, or other such operations, a description of which, with a more minute account of the first machine, we shall lay before our readers at a future time.

---

*Railway Speed and Safety.*—The following paragraph is from a late London paper:

"The returns given in the report of the officers of the railway department, board of trade, shows the average speed upon the various lines, exclusive of stoppage, as follows: London and Birmingham, **27** miles per hour; Great Western, **33**; Northern and Eastern, **36**; North Midland, **29**; Midland Counties, **28**; Manchester and Birmingham, **25**; Newcastle and North Shields, **30**; Chester and Birkenhead, **28**; and Birmingham and Derby, **19**. The average speed on the Metropolitan lines, exclusive of stoppages, is about **22** miles an hour.

The foregoing returns of speed on the English railways shows an average rate exceeding the rates in this country, say **19** to **20** miles per hour. On some of our best roads, with the heavy edge rails, we have accomplished as high rates of speed, to wit, a mile in a minute, as was once performed in England. Our engines have drawn larger loads up higher grades in comparison to their weight. The great difficulty with most of our roads is, that they are too slightly built, from the dificiency of capital in this country. There will be no difficulty with a good road, *and none other should be built*, between this city and Albany, in accomplishing the distance in six hours, which is only **25** miles per hour, a speed **33** per cent. less than that performed on the Northern and Eastern railroad.

Mr. Lang, in a report to the London board of trade, shows by a number of facts, "that railways are the safest of all modes of conveyance, and more particularly safe than steamboat travelling." From 1st January to 1st July **1841**, only three lost their lives from causes beyond their control. The number of passengers travelling was **9,122,000**. The distance travelled, **182,440,000** miles. The number killed from causes beyond control were one to **3,040,666**. Only one passenger lost his life for each **60,813,333** miles travelled. J. E. B.

---

If any one of our readers can make anything out of the following announcement, we will cheerfully yield him our editorial pen and scissors, and resign.

*Revolving Steamer.*—We have unintentionally neglected to speak of a model of a vessel, that has been exposed to public inspection at the St. Charles Exchange, which has been the subject of no little speculation. The

vessel is composed of a number of air-tight boxes, connected together by hinges, which revolve over two wheels at the extremity of the boat. There are two sets of these boxes, and the engine is to be fixed between them. When the machinery is put in motion, the wheels which keep the "chain of boxes" distended revolve with rapidity, and the boxes of course pass around them. At the top of each box is a fixed paddle intended to take hold upon the water as it revolves. By this contrivance it is thought by the inventor that the vessel will be propelled with nearly the same velocity through the water as it has no water to displace by pressing through it, but roll over its surface. The revolving boxes, air tight, are in fact the vessel itself.—*New Orleans Bee.*

---

*Electro-Magnetic Telegraph.*—We are gratified to state that the board of directors of the Baltimore and Ohio railroad company has given permission to Professor Morse to use the track of the Washington road for the purpose of carrying out the intentions of the act of Congress in reference to his important invention of the electro-magnetic telegraph. One station of the telegraph will be at some appropriate place in the city of Washington, and the other in the city of Baltimore, and the communication between them will be effected by properly prepared wires laid along the line of the railroad. The object of this arrangement is to prove what Professor Morse has already most satisfactorily shown on a less extended scale, that the lengh of the line of communication presents no obstacle whatever to the instant transmission of intelligence between the two extremes, either by day or night. We predict for this ardent votary of science the triumphant success that he so well merits.—*Baltimore American.*

---

*Ballooning the Atlantic.*—Mr. J. Wise, the celebrated balloonist, gives notice to all the world, that he will very shortly make an ærial trip with his balloon across the Atlantic. He thus concludes his communication:

The balloon is to be 100 feet in diameter, which will give a nett ascending power of 25,000 pounds, being amply sufficient to make every thing safe and comfortable. A seaworthy boat is to be used for the car, which is to be depended on, in case the balloon should happen to fall in accomplishing the voyage. The boat would also be calculated upon in case the regular current of wind should be diverted from the course by the influence of the ocean, or through other causes. The crew to consist of three persons, viz: an Æronaut, a Navigator, and a Scientific Landsman.

Therefore, the people of Europe, Africa, Asia, and all other parts, on the ocean or elsewhere, who have never seen a balloon, will bear in mind, that it is a large globe made of cloth, ensconced in a nett work, with a sloop hanging underneath it, containing the "latest news from the United States," with the crew of the world's obedient servant. JOHN WISE.

*Lancaster, Pa., June 8th,* 1842.

---

KITE'S PATENT SAFETY BEAM.

We have frequently noticed this truly valuable railroad invention. It is simple, cheap and effectual, while there is no other method of accomplishing the same end. Our attention has recently been drawn to other benefits besides safety to the traveller, which may be derived from a use of Mr. Kite's invention—we mean saving of time to the passenger, and of money to the railroad company. We have recently had some experience upon this point. On the Long Island railroad, over which we pass six times a week, a num-

ber of axles have been broken in the last six months—the cold weather of February was particularly fruitful in such accidents. On one of these occasions, the whole train was detained by the axle breaking under the tender; and before any advance could be made, the tender had to be removed and another furnished. The whole delay occupied about two hours. Now two hours for two hundred passengers, makes four hundred hours lost, or *forty days*, of ten working hours each—worth to a mere day laborer forty dollars, or enough to pay for the construction of a safety beam to every tender used on the road.

If Kite's safety beam had been used, *no delay* would have taken place, and *few, if any of the passengers would have ever known of the accident!* On several other occasions we have noticed, that the destruction of one axle involved that of several others, generally of all the wheels attached to them, and always of more or less of the track. Now the damage in each instance —leaving out of the account the injury to the cars and freight, sometimes a very serious one—would in no case be less than fifty dollars. We have thus the loss of forty or fifty dollars worth of time to the passengers, and of fifty dollars worth of damage to the company—always one or the other, and sometimes both at the same time—and all for want of this simple and economical preventive. These instances, we believe, are by no means rare on other roads; we only mention these as coming under our immediate observation. The company in question have, we understand, a few of these beams in use, and, so far as we have seen, no accident has ever happened to them; *they*, therefore, have an inducement to the employment of Mr. Kite's invention, which others have not.

Until something better can be devised, we shall continue to insist upon the necessity of employing Kite's safty beam.

---

For the American Railroad Journal, and Mechanics' Magazine.

## NOTES ON PRACTICAL ENGINEERING.—NO. 1.

### *Cubical Quantities.*

It is probable that all Engineers have, at different periods of their practice, devoted much time and attention to various methods of calculating cubical quantities. Innumerable tables have been formed and some few printed, but the writer is not aware that any tables of a general character have been published, except those of Mr. E. F. Johnson.

These tables give the cubic yards for 10 feet in length of pyramids, frustrums of pyramids and triangular prisms with slopes of $\frac{1}{2}$, 1, $1\frac{1}{2}$ and 2 to 1 when the depths at the ends are known. Also the cubic yards in rectangular prisms 10 feet wide, and, as in the other solids, 10 feet long. The calculations are made for depths from 2 to 54 feet, the common difference being 2 and the column of depths headed D+d represents the sum of the depths at the two ends.

| D+d | Pyramids. d=0 | | | | Frustrums of Pyramids. d=1(D+d) D=9(D+d) | | | | d=2(D+d) D=8(D+d) | | | | d=3(D+d) D=7(D+d) | | | | d=4(D+d) D=6(D+d) | | | | Triangular Prisms. D=d | | | | Rectangular Prisms 10 feet breadth. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | b=½D | b=D | b=1½D | b=2D | b=½D | b=D | b=1½D | b=2D | b=½D | b=D | b=1½D | b=2D | b=½D | b=D | b=1½D | b=2D | b=½D | b=D | b=1½D | b=2D | b=½D | b=D | b=1½D | b=2D | |
| Feet. | c.yds. | c.yds. | c. yds. | c. yds. | c.yds. | c.yds. | c.yds. | c. yds. | c.yds. | c.yds. | c.yds. | c. yds. | c.yds. | c.yds. | c.yds. | c. yds. | c.yds. | c.yds. | c.yds. | c. yds. | c.yds. | c.yds. | c.yds. | c. yds. | c. yds. |
| 10·0 | 3·09 | 6·17 | 9·26 | 12·35 | 2·81 | 5·61 | 8·42 | 11·23 | 2·59 | 5·18 | 7·77 | 10·36 | 2·44 | 4·87 | 7·31 | 9·75 | 2·34 | 4·69 | 7·03 | 9·37 | 2·31 | 4·63 | 6·94 | 9·25 | 18·52 |
| 10·2 | 3·21 | 6·42 | 9·63 | 12·84 | 2·92 | 5·84 | 8·76 | 11·68 | 2·69 | 5·40 | 8·09 | 10·78 | 2·54 | 5·07 | 7·61 | 10·15 | 2·44 | 4·88 | 7·32 | 9·76 | 2·41 | 4·81 | 7·22 | 9·63 | 18·89 |
| 10·4 | 3·34 | 6·67 | 10·01 | 13·35 | 3·04 | 6·07 | 9·11 | 12·15 | 2·80 | 5·61 | 8·41 | 11·21 | 2·64 | 5·27 | 7·91 | 10·55 | 2·54 | 5·07 | 7·61 | 10·15 | 2·50 | 5·01 | 7·51 | 10·01 | 19·26 |
| 10·6 | 3·47 | 6·93 | 10·40 | 13·87 | 3·15 | 6·31 | 9·46 | 12·61 | 2·91 | 5·82 | 8·73 | 11·64 | 2·74 | 5·47 | 8·21 | 10·95 | 2·63 | 5·27 | 7·90 | 10·53 | 2·60 | 5·20 | 7·80 | 10·40 | 19·63 |
| 10·8 | 3·60 | 7·20 | 10·80 | 14·40 | 3·28 | 6·55 | 9·83 | 13·11 | 3·02 | 6·05 | 9·07 | 12·09 | 2·84 | 5·69 | 8·53 | 11·37 | 2·74 | 5·47 | 8·21 | 10·95 | 2·70 | 5·40 | 8·10 | 10·80 | 20·00 |

The slope and depth are the only data required to calculate the cubic contents of the pyramids and prisms. But with the frustrums the case is different, for the ratio of the depths is here an element and, in the tables under consideration, four different ratios of D to d are given. Intermediate ratios may be closely approximated by a proportion, but as this is troublesome and as frustrums are the solids generally met with, the writer would suggest the use of an auxiliary table, (I,) calculated in the following manner.

It is shown by Mr. S. Hughes, in the Civil Engineer and Architects Journal, 1840, p. 335, that the content calculated from the mean depth or $\frac{1}{2}(D+d)$ is less than the true quantity by $\frac{1}{12}(D-d)^2 r$, [$r$ being the ratio of base to height] and that the quantity determined by averaging the end areas exceeds the true content by $\frac{1}{6}(D-d)^2 r$, the deficiency of the former being half the excess of the latter. Now, the mean depth or $\frac{1}{2}(D+d)$ is equivalent to taking D=d, giving of course a triangular prism, hence, taking D+d from the column of triangular prisms with the proper slope and simply adding $\frac{1}{12}(D-d)^2 r$, from a table very easily formed, we have the true content. This is almost as quickly done as to determine the ratio and take the corresponding quantity from the column of frustrums, and when the ratio is not found in the table it will save some trouble. Table I gives the correction to be added to the content due to the mean depth for different values of D—d from 1 to 10 feet [for each tenth of a foot] in cubic yards per 100 feet with a slope of 1½ to 1. It may be carried as far as required by the method of second differences and the quantities vary directly as the slope or as $r$.

TABLE I.

$\frac{1}{1\frac{1}{2}}(D-d)^2 \times 1{\cdot}5 \times \frac{100}{27}$.

| D—d | 0 | ·1 | ·2 | ·3 | ·4 | ·5 | ·6 | ·7 | ·8 | ·9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0·46 | ·56 | ·66 | ·78 | ·91 | 1·0 | 1·2 | 1·3 | 1·5 | 1·7 |
| 2 | 1·85 | 2·0 | 2·2 | 2·4 | 2·6 | 2·8 | 3·1 | 3·3 | 3·6 | 3·9 |
| 3 | 4·17 | 4·4 | 4·7 | 5·0 | 5·4 | 5·7 | 6·0 | 6·3 | 6·7 | 7·1 |
| 4 | 7·41 | 7·8 | 8·2 | 8·6 | 9·0 | 9·4 | 9·8 | 10·3 | 10·7 | 11·2 |
| 5 | 11·58 | 12·1 | 12·5 | 13·0 | 13·6 | 14·1 | 14·6 | 15·2 | 15·7 | 16·1 |
| 6 | 16·67 | 17·2 | 17·8 | 18·4 | 19·0 | 19·7 | 20·3 | 20·9 | 21·6 | 22·1 |
| 7 | 22·68 | 23·4 | 24·1 | 24·7 | 25·4 | 26·2 | 26·9 | 27·7 | 28·4 | 29·1 |
| 8 | 29·63 | 30·4 | 31·2 | 31·9 | 32·7 | 33·6 | 34·4 | 35·2 | 36·1 | 36·8 |
| 9 | 37·96 | 38·8 | 39·7 | 40·6 | 41·5 | 41·8 | 42·5 | 43·4 | 44·3 | 45·3 |
| 10 | 46·29 | | | | | | | | | |

Mr. Hughes' investigations led him to conclude that little aid could be derived from the use of tables, though he refers exclusively to even cutting. Take, for example, the following: width of base **20** feet, slope $1\frac{1}{2}$ to **1**, heights or depths **6** and **4** feet, length **100** feet; required the cubic content. From a table of even cutting or embankment we find $\frac{1}{2}(D+d)=5$ feet $=509{\cdot}2$ c. yds. per ch. and adding the correction for $D-d=2$ feet $=1{\cdot}8$ per table I, we have $509{\cdot}2+1{\cdot}8$ **511·0** c. yds. the true content. Or, if we take the average of the quantities due to depths of **6** and **4** feet, we have $\frac{1}{2}(644{\cdot}4+385{\cdot}1)=514{\cdot}7$ and deducting (twice the quantity in table I due to $D-d=2=)3{\cdot}7$ we have, as before, **511** c. yds. per ch.

Mr. Hughes prefers calculating each area; but it is only fair to observe that he takes a quarter of a mile at a time when the ground slopes evenly, whereas the custom in this conntry is, to take a level every chain for the roughest estimates, which of course renders the correction for longitudinal slopes less important. He does not even allude to the transverse slope.

Since reading Mr. Hughes' paper, the writer has seen in manuscript these same formulæ accompanying very extensive tables for different bases, slopes and depths, taking also into account the transverse slope, which is in fact the great difficulty. These tables were made by Mr. Lewis of Philadelphia; they are preceded by a thorough investigation into and complete demonstrations of the accuracy of the principles on which they are formed and have been partially in use for many years. The corrections for the longitudinal slope in even cutting are taken from tables similar to table I in this paper, and the effects of the transverse slopes are determined in a manner entirely different from that adopted by Mr. Johnson. But, as Mr. Lewis' treatise and tables have not been published, the writer does not feel at liberty to state more, than these and those of Mr. Johnson are the only papers in which he has seen a general as well as scientific examination into the measurement of cubical quantities for canals, railways, etc., with the requisite tables for practice.

When the ground slopes transversely it becomes necessary to cut it up into the solids at the heads of the columns of Mr. Johnson's tables in the ac-

companying extract.* The central or rectangular portions may be, in all cases, taken from tables so easily formed as to require no illustration or they may be calculated with great rapidity from the column of "Rectangular Prisms." When the ratios of D to d in the side pieces are not to be found in the table then the quantity opposite D+d may be taken from the column of "Triangular Prisms," and half the correction due to D---d in table I being added, the sum will give the correct content. Half the correction only is added, because table I is calculated for both sides.

Suppose D=6 and d=4, slopes $1\frac{1}{2}$ to 1 then, the ratio being in the table we find at once the content for one side piece or frustrum=70·3 c. yds. per 100 feet. But if D=6·4 and d=3·6 then take D+d from the column of prisms=69·4 and add from table I, $\frac{1}{2}$(D---d)=1·8 c. yds. and we have 69·4+1·8=71·2 c. yds. per ch., the true content.

In this case D and d represent the *mean* depths at the ends, and another correction is required for the transverse slope, which is explained at length by Mr. Johnson, to which the writer has nothing to add, the only modification he has ventured to suggest being the additional table to give the contents of frustrums of pyramids by means of the difference in place of the ratio of their depths. In another number some views will be offered on approximate methods for preliminary surveys.

*New York, July*, 1843. W. R. C.

---

The pressure of other matter has compelled us to defer to the present number the conclusion of the excellent article on iron manufacture. It should have appeared in the last number, but its interest will not have suffered by the delay.

PRACTICAL REMARKS ON BLAST FURNACES.---BY GEORGE THOMPSON, ESQ., MINING ENGINEER.

[Continued from page 204.]

These general facts seem to contradict the opinion, that the whole *rationale* of the effect of the hot blast is merely a decrease in the density of the blast, because, with the inferior material, which requires with *cold* blast the *greatest* density, the *hot* blast has the greatest and *best effect*.

Those who are acquainted with cold blast working, know that most materials work best with what is technically called a "snuff" at the tweres; and to form this it is usual to blow a few inches below the surface of the scoria, which floats on the iron in the hearth. The "snuff" is a kind of arched tube formed by the cinder at the end of twere in the inside of furnace, and through which the blast passes. Now it appears to me that this natural muzzle of cinder has a great deal to do in diffusing the blast in contact with the material; and, mark that those materials which, from inferiority, required blast of the greatest density, gave the greatest trouble at the tweres, and presented practical difficulties in the "snuffing," which required a great pressure mechanically to overcome, and clear away for the passage of the blast upwards; for *such* materials, from what cause I know not, always work with great uncertainty at the tweres---sometimes having a tendency to stop up entirely, at others not snuffing at all.

If this practical difficulty could be avoided, perhaps the bad material might give a better result with a soft blast than we found it to do.

---

* See page 269.

As regards the blast's density, when used hot, it must of necessity be much less than cold; for the quantity of air injected from the blowing apparatus is, generally speaking, no more with hot blast than with cold, while the area of the nose-pipes, taken together, is doubled or trebled. The diffusion of the blast by increasing the number of nose-pipes, and disposing them around the hearth, has produced great increase in make; and in some cases by this, together with increased shape, coals have been brought to work raw which with the first hot blast trials, could only be used when coked.

It seems agreed on all hands, the greater the number of the tweres around the hearth the better: and as I am aware that practical difficulties occur in doing so by the furnace "blowing forward," I will state a simple plan by which we overcame the difficulty. In building our furnace we had a round base as is now common, but instead of the usual four openings, we made five, one for the opening of the hearth, and *four for tweres.* By this method the blast from one twere does not blow against the other, and neither of them blow directly to the fore part; thus *eight tweres* may be used, two at each twere side.

More pressure is required even with hot blast to work some materials than others. For instance, we required but **2 1-2** lbs. per inch in North Staffordshire when working coke, but with coal, **3** lbs. per inch, with much greater heating surface, was required. The quantity of blast required here was very great. Blowing at four sides, we injected into a furnace fully **3000** cubic feet of air per minute, and heated to a high temperature. If this pressure happened at any time to be reduced, the effect was immediately perceptible, or if one of the tweres was taken off, a falling off in quantity and yield was the immediate consequence. The materials were, as I have before noticed, the worst I ever saw; both coals and ironstone being sulphury.

I will give only one other fact, a very extraordinary one, showing a most peculiar effect produced by a *simple increase of temperature*, at a work near Tipton, where the materials are of fair quality. The furnace upon which the experiment was made is only **11 1-2** feet at "bosh," and **45** feet high, worked with raw coal and hot blast; it produced **100** tons a week, being blown with five tweres, of **3** inches diameter each.

The cross pipes of the heating apparatus were four inches diameter, and one apparatus supplied all the tweres.

The alteration was this, the number of heating pipes was increased, the cross pipes increased in size from **4** inches diameter to **7** inches diameter, and the main pipes also enlarged; the top of the furnace widened from **4** feet diameter to **7** feet diameter; the number of tweres increased from five to six, two on each side and two at back, each of **3 1-2** inches diameter; a new steam cylinder of greater power was put to the blast engine, but the blast one was kept at the same size.

The consequence is, that more than **150** tons of iron have been produced at this furnace in one week, with an improvement of yield, and the *engine goes no more strokes*, showing that actually no more *air* is forced into the furnace than when making only **100** tons a week, two-thirds of present quantity, although with a much greater area of nozzles.

I give a short table of the pressure of blast, which shows that the quantity of blast bears no constant proportion to the capacity of furnace nor to the make. The results given from the Glasgow furnaces are taken from data by M. Dufrenoy in **1833**, but since that period, the areas of nose pipes, and the number, and consequently make, have been increased as at other places.

This table shows that the quantity of blast varies with different material

to produce the same quantity of iron, especially with cold blast, with hot blast the *areas* bear little relation to the actual quantity of air injected, which cannot be arrived at without the capacity of the blowing cylinder and speed of engines.

TABLE No. II.

| COLD BLAST. | Pressure in pounds. | Total area of nose pipes in circular inches. | Capacity of furnace, cubic feet. | Weekly make of iron. |
|---|---|---|---|---|
| Works near Glasgow, | 3 | 12·5 | 2500 | 45 Tons. |
| Lightmoor works with *bad* material, | 3 | 15 | 2000 | 45 " |
| Same, with *good* material, | 2½ | 12·5 | | 65 " |
| Fenton Park, with *bad* material, | 2½ | 12·5 | 1000 | 25 " |
| Corbyns Hall, Mr. Gibbons, *good* material. | 2 | 18·2 | 4000 | 115 " |

| HOT BLAST. | Pressure in pounds. | Total area of nose pipes in circular inches. | Capacity of furnace, cubic feet. | Weekly make of iron. |
|---|---|---|---|---|
| Works near Glasgow, | 2¼ | 18 | 2500 | 60 Tons. |
| Fenton Park works, | 2½ | 27 | 1000 | 40 " |
| The same, with different shape of furnace, | 3 | 36 | 2500 | 70 " |
| Tipton, a work at, | 2¼ | 45 | 2200 | 100 " |
| The same, with increased heating surface, but no greater *quantity* of blast. | 2¼ | 72 | 2600 | 150 " |

The tables and statements are much more general than I could have wished; at the same time I think they sufficiently show that, 1st, there is a remarkable difference in the material of different strata in the same coal fields; 2d, that modifications of shape and alteration of capacity have a very considerable effect; and 3d, that the effect of blast is very various with different materials; that an alteration of its temperature, with certain coals, produces a saving of, in some cases one-half, in others two-thirds of the quantity, while with other coals the difference is scarcely perceptible, and the quantity of blast has little relation to the quantity or bulk of material acted upon.

The improvements in iron smelting have been effected simply by the observation and consequent successive trials of practical men; they have been the result of no principle previously established, no theory obtained from the laboratory of the chemist: and further, I think it cannot be denied that the anomalies apparent under each condition into which I have divided my results, present a problem which, as far as chemical analysis has yet gone, it is difficult to solve. And it must surely be admitted that, had these conditions been previously laid down to any one well acquainted, theoretically or practically, or both, with the manufacture of iron, together with a careful analysis of the material here referred to, he would never have predicated such results as have in reality accrued.

That the want of a guiding principle is greatly felt, and its attainment greatly to be desired, needs not to be set forth; and as there is no effect

without a cause, I do not see that the number of apparent contradictions in these ought to make us in the least despair of ultimately attaining, by the powerful aid of science, a satisfactory rationale of the whole case. This, however, will never be done by avoiding the question, by taking a partial view of facts.

---

READING RAILROAD AND THE COAL TRADE.

In our last number this road was referred to for the purpose of showing the economy which will result to the consumers of anthracite coal, from its ability to reduce the cost of transportation. More than three-fifths of the cost of our coal in New York, is paid for transportation and other expenses after it leaves the mines. Consequently, as the facilities for transportation, and handling the coal after it leaves the mines, are increased, so will the cost be reduced to the consumer.

The average cost of transportation by the Schuylkill Navigation company for the years 1835, 6, 7, and 8, was, *freight* $1 28 and *toll* 92 cents, or $2 20 per ton, exclusive we believe, of the cost of trans-shipment from *boats* to *vessels* at Philadelphia; whereas, it is now only 70 cents freight and 54 cents toll, or $1 24 per ton exclusive of cost of trans-shipment as above, thus showing conclusively what has been effected by the completion of the Reading and Pottsville railroad, and enabling us to draw tolerably correct inferences as to its future advantages to the consumers of coal, to say nothing of its utility to the travelling community and to the cultivators of the soil in the beautiful and fertile valley through which it is located.

This road may, we think, be considered a model road for a heavy business in one direction. Its grade is unequalled on a road of its length, either in this country or Europe, and its curves exceedingly favorable, for a heavy trade. There is no curve, we believe, with a radius of less than a thousand feet. The road-bed is graded the entire distance for a double track, though but a single track is laid, except at suitable places for passing the trains, and the distance of about 18 miles between Reading and Pottstown, where a second track is now nearly completed, which will greatly increase the capacity of the road for the coal business.

The superstructure is of a permanent, yet very simple character, consisting of the T rail, as it is called, of 56 lbs. to the yard, laid on cross sills of oak, 8×12 inches; resting on broken stone well rammed, in trenches.

The facilities at Mount Carbon for collecting the coal, appear well arranged; the cars of the company which are uniform in size and appearance and made to contain each 3¼ tons, are taken by the coliers to the mines, loaded and returned to the depot, where each car is weighed and then arranged in trains on the side track ready for departure. The company have now about 26 to 28 locomotives, eight being light for passengers and common freight, and the others heavy for coal; 14 passenger cars, mostly on 8 wheels; 175 freight, and 1600 coal cars, the latter are to be gradually increased to 2500, and the engines to 32 or more as may be requisite.

The arrangements for an extensive business on this road appear well

made; but with no part were we better satisfied than with the depot at its termination at Richmond, about three miles north of Market street, where the company own 45 acres of land, fronting 2200 feet on the river, a part only of which is yet improved. Here the company have seven piers, nearly completed, where 12 to 15 vessels may be loaded at the same time, and with a facility truly astonishing. These piers are built of truss work, 10 or 12 feet above high tide, with tracks laid to their extreme ends, with openings in the floor between the rails, and slides or shutes beneath, by means of which, the coal, when discharged through a trap door in the bottom of the car, is carried directly into the hold or on to the deck of the vessel along side, and so complete are the arrangements that when the car is brought to the proper place, the load can be discharged *into the vessel* in one minute, and a vessel of 200 tons loaded in a few hours, and under sail for the port of her destination the same day; and thus the coal by the *railroad* may often be unloading at the wharves in New York, while coal shipped same day by canal at Pottsville, is being trans-shipped at Philadelphia.

The freight on coal is certainly as low as it can be afforded. The fare for passengers was, we thought, too high, $3 50 for 96 miles—and we so intimated to the gentlemen in charge. We closed our article on this road, in the August number by refering to the *rates of fare*, and we promised to give them a word of advice in our next, but are happy to be able to say that the gentlemen who manage the Reading railroad have consulted better counsellors than we claim to be---their own good judgment---and their interest, and reduced their rates, as we learn from the Miners' Journal of Pottsville, for *through* passengers, from $3 50 to $2 50; and the result will, we doubt not, at least we *hope* it may be, a handsome increase of receipts for the ensuing year.

The entire amount of coal transported on the railroad last year, was 54,000 tons; this year to 25th July, 81,000 tons, and the company now run eight daily trains of 50 to 60 cars each. But they have *not yet fairly commenced* operations. It will require about three years to get thoroughly organized and in possession of the business, and then they will *average* about fifteen trains per day, of 150 tons each, for 10 months in the year.

---

## GOVERNMENT AID TO RAILWAYS.

The following letter was addressed, by request, to the President of the New York and Albany railroad company, and by him transmitted to the heads of the War and Post Office departments at Washington. It was published by order of Congress. See No. 327 senate documents, 27th congress 2d session. The great importance of the subject will be deemed a sufficient excuse for its republication in the columns of the Journal.

DEAR SIR: In accordance with your request, I give you my views on the subject of aid to railways by the general government. This aid, if rendered, will probably be given for the following reasons:

1. The great importance and value of railways in contributing to the defence of the country.

2. The facilities they afford for the speedy and cheap transportation of the mails.

I have long been of the opinion that the railway system, when perfected, would be found in time of war one of the most efficient means of defence.

For the rapid transportation of troops and munitions, etc., at all seasons railways are unrivalled by any other mode of communication. It is fortunate that, excelling as they do in this respect, they are, if anything, superior to other modes of artificial communication for commercial purposes. It is fortunate, also, that railways judiciously located, with a view to the latter object, connecting the larger cities by routes passing in a direction where the population is the most dense, and where, in general, the ground is the most favorable, are in the best positions for collecting the military force of the country, and concentrating it upon those points which are most important to be defended.

In all military operations celerity of movement is of the utmost importance. The history of modern warfare is indeed conclusive in this respect. With the means of quick conveyance afforded by railways, an army of a given number of men may be rendered as effective as one composed of double or treble that number deprived of those facilities, and the forces of the country may be so rapidly concentrated at any exposed point as to enable us, at short notice, to arrest the advance of an invading enemy before he shall have made a lodgment on our soil, or effected any serious injury. The citizen-soldier, who, in time of war, is to-day cultivating his fields in the interior of our own State, [New York,] may to-morrow be found battling with the enemy on the banks of the Niagara, or resisting his approach to the shores of New England.

The extent of railways already constructed and in operation in the United States amounting, in the aggregate, to upward of *three thousand* miles, together with the great extent of steam navigation on our inland lakes and rivers, places us, as it regards our ability to repel invasion, in a condition far superior to that in which we were found during the last war with Great Britain. Then there was almost a total want of all suitable means of internal communication, and, in consequence, the land operations were conducted in a comparatively feeble and inefficient manner. Now, with the means at command, and which, under suitable encouragement, will be yearly increasing, through the extension of the railway system, together with the rapid increase in the population and improvements in the arts and the defences of the country, we are, or soon will be, in a condition which will render us secure, as it regards serious injury, from the attacks of any foreign enemy.

Of the railways constructed and in operation in the United States, a very large majority have been built by private means under acts of incorporation from the several States. In some instances they have been constructed by the States; but the ill success thus far of this mode, combined with the evils of a political character inseparable from it, its expense, and the evident impropriety of making the States the common carriers of the produce of the country, renders it probable that but few railroads will hereafter be constructed as State works.

Works of this description will, it is presumed, be mostly undertaken, as heretofore, by private companies, and it is with them that arrangements must be made, if they are to be used for the purposes of the Government in the conveyance of troops and munitions of war and the transmission of the

mails. Experience has shown that the railway system, to become sufficiently general, requires the fostering aid of the government.

While the country was unusually prosperous, and confidence was firm in the success of improvements of this description, capitalists were willing to invest their funds in them. Circumstances are now different, and the aid of the government seems to be indispensable to cause the system to advance at a rate suited to the growing population and wants of the country.

The very limited aid which the general government has hitherto given to railways, by remitting the duties upon iron used in their construction, has been of great service. This aid was granted without any understanding with the companies as to the conditions on which the roads, when completed, should be placed at the service of the government. In consequence of which, the government has been, in many instances, compelled either to pay very extravagant prices, or forego the advantages which railways offer for rapid transportation in the conveyance of the mails, and for other purposes.

This should not be, and the government, in giving further aid, should secure to itself the use of the railroads upon the most equitable terms. This is the more necessary, inasmuch as it is desirable to reduce the rates of postage, particularly upon letters, which are now exorbitantly high, and, of course, to lessen as far as possible the cost of transportation of the mails.

Congress, at its last extra session, amended, or rather altered, the law relating to duties on railroad iron, so as to preclude the companies which had not then commenced the construction of their roads from benefiting by the remission of duties on that article. Should legislation stop here, great injustice will result. Of the railways in operation in the United States the majority are confined to particular States or sections of the Union. In several of the States and Territories no railroads have been constructed, and in others improvements of this description have but just been commenced. There seems, therefore, to exist a necessity founded on principles of equity that the aid of the general government should be continued to new works in the same proportion as hitherto—if not by the same mode of a release of the duties on railroad iron, by an equivalent thereto in money.

The aid thus given will fall far short of the benefits to be derived to the country from having a perfect system of railway communication constructed and ready for use on reasonable terms. I would therefore propose, with a view of giving the requisite encouragement to the prosecution of new works, and of securing for the use of the government, on reasonable terms, those already in operation, that *further* aid be rendered as follows, viz:

All lines of railway completed and ready for use of not less than fifteen miles in extent to be entitled to a fixed sum per mile, say *twenty-five hundred dollars.*

In consideration of the aid thus given, the several companies to bind themselves----

1. To convey the government mails as often as twice each day in opposite directions over the whole extent, or any portion of their respective roads, at a speed of not less than seventeen miles per hour, at the following rates of compensation:

For every mail weighing two hundred pounds or less, ten cents per mile.

For each one hundred pounds additional one cent per mile.

2. Each mail to be accompanied, if required, with a deputy postmaster or attendant, for whose conveyance no charge is to be made; and at all points on the line where mails are to be exchanged sufficient time to be allowed for the purpose.

3. If the mail is required to pass four times daily over any road, twice in

the same direction, then, for this additional service, the rates to be the same as above, unless a locomotive is run especially for the purpose, in which case the compensation to be fixed by three disinterested persons, which compensation shall not exceed treble the rates above stated.

4. For the conveyance of ordnance and military and naval stores of every description for the general and state governments, per ton per mile, two cents.

5. If the amount of ordnance and military or naval stores conveyed as above at any one time by a locomotive expressly detached for the purpose is less than fifty tons, the rate to be one dollar per mile for the whole load. If over fifty tons, the rate not to exceed two cents per ton per mile.

6. For conveying each person attached either to the regular army, the militia, or the navy, below the grade of commissioned officers, when in service, either in peace or war, one cent per mile.

These conditions should be binding, not only upon the railway companies, but upon their successors owning the roads.

The several prices or amounts stated may not be the best or most judicious in each case, but it is believed that the outlines of the plan are such as will prove most equitable to the companies, and economical and effective to the government.

The plan which has been suggested of paying to each railway company a gross sum in advance for the transportation of the mails during the existence of their respective charters, is objectionable, as it tends to inequality and injustice in the compensation to different companies, and will require to effect it a greater present outlay of funds than it may be convenient for the government to furnish. It is objectionable, also, in consequence of the difficulty of anticipating the future wants of the government, and ability of the companies to fulfil their engagements.

The causes which have hitherto produced a rapid improvement of the country, are still in existence, and will under a restoration of confidence, which is sure to take place, continue to produce its legitimate effects, rendering it impossible to predict the changes which even a few years may produce.

New and more direct thoroughfares may be opened, causing an entire change both in the weight and periods of transmission of the mails. Where now the mails are lightly burdened, the weight may be found greatly to increase, and the intervals of their transmission lessened, and the reverse.

The companies having received compensation in full in advance will have no sufficient inducement to fulfil faithfully and promptly in all cases their agreements, even if they have the ability to do so, and may be disposed to embarrass as much as possible, without violating the strict letter of their contracts, the operations of the post office department for the purpose of securing additional and exorbitant compensation.

By this plan also, the government is placed at the mercy of the railway companies, as it regards the use of their roads for military purposes, thus depriving itself of one of the greatest advantages to be derived from contributing its aid to the construction of railways.

The two objects of military defence and the conveyance of the mails should not, I think, be separated in legislating upon this subject.

The public welfare is intimately connected with both, and they are both, it is believed, clearly within the constitutional powers of congress to foster and promote in the manner above described. Railways at the present day are indeed *indispensable* for both purposes.

The amount of two thousand five hundred dollars per mile may be great-

er than is necessary to place these works at the service of the government, but even that will not amount to a large sum in the aggregate.

The total extent of railway now in operation in the United States is about *three thousand* miles, which, at two thousand five hundred dollars per mile, is *seven and a half millions* of dollars, a sum small in comparison with the advantages the country will derive from being able to avail itself in case of war, and for the other purposes mentioned, of the roads now in use, even if there should no stipulations be entered into, as to the terms on which transportation for the government is to be conducted.

The very great utility and importance of railways in a military view, do not seem to have been, as yet, fully appreciated.

All those sea ports which have these communications with the interior, possess resources and means of defence of almost incalculable value.

Among the most favored of their number is the city of Boston. From that city five lines of raliway radiate in as many different directions into New England, and one of them after traversing the length of Massachusetts, enters the State of New York, and connects at Albany with the lines of railway extending west and north of that city.

By means of these railways the city of Boston is enabled to command within two to four days' notice, at all seasons of the year, the whole disposable force spread over New England, and northern and western New York. The grand depot of the government arms and munitions for the northern section of the Union at Watervliet on the Hudson river, is now brought within twelve hours of Boston. Thus situated, the city of Boston possesses resources and a degree strength to resist invasion which is not possessed by New York. The latter city, unlike every other leading city on the Atlantic seaboard, has no direct railway communication with the interior of the country. In winter she is cut off except by a circuitous route through other States, and the exposed navigation of Long Island sound, from all access to the great military depot, at Watervliet, above mentioned, and from the aid which, in case of an attack, would instantly rally to her defence, from the west, the north, and the east.

The construction of the New York and Albany railroad will supply to New York city, more than any other work of internal improvement, the means of defence, giving her all the advantages in this respect possessed by Boston.

The proportion of government aid which would fall to this work, at the rate above proposed of two thousand five hundred per mile, will be three hundred and seventy-five thousand dollars, a sum not greater than the cost of one of the steam frigates recently constructed,* and not requiring like them, the *additional expenditure of large sums annually*, to maintain and preserve in a condition for use.

Of the great value of the railway in its ability to contribute to the defence of the city, there can be no doubt. If constructed and operated in the best manner, with a branch connecting with the eastern roads, the force of men and ordnance which might be brought to New York, at short notice, could not, from its magnitude, be easily computed.

By an attentive consideration of the subject, we shall not fail to discover in the railway system, the elements of great strength in a military view, so essential to our independence and safety, the importance of which is so often

* The steam frigates referred to are the Missouri and Mississippi. The cost of the former, as since ascertained is $566,458·28, and of the latter, is $553,759·93! This is exclusive of the large amount recently expended in abortive attempts to dispense with the chimney or smoke pipe in the former vessel.

lost sight of, so easy is it in times of peace to forget that wars have been, and that the feelings and passions of mankind have in no wise materially changed.

To those who view with regret the necessity which exists of expending large sums in the erection and maintenance of the defences of the country, to enable us to resist encroachments upon our rights from abroad, it will be gratifying to know, that the government in giving its aid to railways for the purposes mentioned, is at the same time promoting in the most effectual manner a system of improvements, which, more than any other, is calculated to contribute to the prosperity of the country in a commercial view, developing more completely its resources, facilitating the early transmission and diffusion of intelligence, and uniting with stronger bonds the different sections of the Union.

EDWIN F. JOHNSON,
*Chief Engineer New York and Albany Railroad.*

*New York, April* 9, 1842.

---

GREAT PERFORMANCE OF A LOCOMOTIVE STEAM ENGINE.

The following statement appeared in the United States (Philadelphia) Gazette, sometime since, but its re-publication in the Journal has been delayed in the expectation of receiving further particulars, in relation to the engine from the manufacturers. They have, however, been so occupied that they have not been able to furnish the desired description; we therefore now give Mr. Campbell's account of the performance on the Columbia road, and think we may promise our readers something further of interest from the same manufactory at an early day, as Messrs. Baldwin and Whitney have made an engine for the Western railroad, which is soon to be tested on its heavy grades, and, from what we learned on a recent visit to their manufactory, we anticipate very favorable results.

We would say, in addition to Mr. Campbell's report that the engine referred to by him, as we are assured by an intelligent friend who witnessed its performance, turned a curve of 90 feet radius repeatedly without any difficulty.

*Mr. Editor*—Messrs. Baldwin and Whitney, engineers of this city, have recently made and patented valuable improvements in their locomotive steam engines, by which the weight upon each pair of wheels is equalized, the facilities for turning curves and conforming to the undulations of the rails increased, and the efficiency for carrying freight, in proportion to the aggregate weight and cost of the engine, nearly doubled as compared with engines of ordinary construction. One of these engines, on six wheels, all of which are connected, was recently finished and placed on the "Philadelphia and Columbia railroad" for trial, where its performance fully realized the expectations of the makers.

The weight of this engine, in running order, including two men, water, and fuel, is 28,500 lbs. or 12 $\frac{72}{100}$ gross tons. The weight of the tender with a full supply of fuel and water, is 25,275 lbs. or 11 $\frac{28}{100}$ gross tons.

The undersigned feeling an interest in all improvements of so much importance to the public, and in the success and economy of railroad transportation, made several trips upon this engine, across the Columbia railroad, in company with Mr. Whitney, one of the builders, with a view of testing its merits. Upon these several occasions, its performance was as follows:

On the 17th of the present month, it drew from the station at the head of the Schuylkill plane, to Columbia, 32 loaded cars, including a three section portable boat, weighing altogether 165 tons 5 cwt., 2 qrs. 13 lbs. exclusive of engine and tender, in 8 hours 30 minutes, running time, distance 78 miles.

On the 18th it returned from Columbia, drawing 40 loaded cars, weighing exclusive of engine and tender, 204 tons, 13 cwt. 2 qrs. 14 lbs. in 8 hours 45 minutes, distance same as before, 78 miles.

On the 22d a full train westward, could not be obtained. The engine started from the Schuylkill station with 20 loaded cars, which were increased at the stations along the line, to 40 cars, generally without cargoes, the engine at no time drawing over 110 tons, exclusive of its own weight and tender.

On the 23d it left Columbia with 47 loaded cars weighing 249 tons, 19 cwt. 3 qrs. 13 lbs., which it drew up all the grades upon the road, to 39 feet rise per mile. It drew 39 of these cars, (including a three section portable boat) weighing 233 tons, up grades 45 feet per mile, time of running 78 miles, 9 hours 18 minutes.

On the 18th the engine evaporated 499½ cubic feet of water, accurately measured, and consumed 2 $\frac{25}{100}$ cords of dry oak wood, and 40 bushels of bituminous coal. On the 23d it evaporated 519 cubic feet of water, and consumed 2 $\frac{34}{100}$ cords of dry oak wood, and 40 bushels bituminous coal. The wood was of good quality, but the coal was unsuitable. It was very fine, and large quantities of it was carried out with the blast from the exhaust steam pipes unconsumed.

Besides the resistance resulting with the *friction* of cars or wagons of a train, an additional resistance occurs from the *gravity* of the whole mass upon the plane. That gravity is the force by virtue of which the train would descend the plane if not resisted, and is equal to the weight of the mass divided by the number that indicates the inclination of the plane.

If therefore, in the case of the ascent of a grade of 45 feet per mile which is one foot in 117½ on the 17th with a train of 165 tons, 5 cwt. 2 qrs. 13 lbs. and the engine and tender weighing 24 tons, the total weight of the mass would be, 189 tons, 5 cwt. 2 qrs. 13 lbs., which divided by 117½ gives the gravity 3613 lbs., which added to the resistance from friction of the cars at 8 lbs. per ton or 1320 lbs. gives a total resistance of 4933 lbs. overcome by the engine, (exclusive of the friction of the engine itself) which on a level railroad, is equal to a train of 616 tons.

On the 18th the resistance overcome by the engine on 45 feet grades was 5997 lbs. which was equal to 749 tons on a level railroad.

On the 23d the resistance from gravity and friction, on 39 feet grades, was 6532 lbs., which was equal to 816 tons on a level railroad. Or in other words the power of the engine exerted horizontally on the rails, would have lifted a weight perpendicularly, if attached to a rope working over a pulley, of 6532 pounds.

The above performances are greater by far, than those of any other engine of the same aggregate weight, known to the undersigned. The improvement is of great value, and really enhances the value of every railroad in the Union, having extensive sources of trade.

H. R. Campbell, C. E.

---

PROGRESS OF THE DOCTRINE OF LOW FARES.

It was not without quite an effort that this doctrine was adopted this season, on the Western railroad, from Worcester to Albany, but its friends finally prevailed, and the result is as we anticipated, a large increase of pas-

sengers, equal during the month of May to 79½ per cent. and during the month of June, to 105 over the corresponding months of 1842.

The Boston and Providence road also adopted the doctrine; the Paterson road followed, and now several of the southern roads *south* of Washington city, as we learn from a gentleman in Richmond Va., have adopted lower rates. He says that the fare is now only $20 from Washington to Charleston, S. C., while it is an *eighth* of that amount, or $2 50 from Baltimore to Washington—40 miles, or over six cents a mile on one of the greatest thoroughfares in the United States. This is a sad mistake as we understand the laws of trade, and will inevitably lead to an opposition line of stages which, though it may not be successful, will injure the railroad by exciting a spirit of hostility not only to that road, but also to the whole system for a time.

We would not have a company reduce their rates so as to injure the stockholders, or to prevent their receiving a fair income upon their investment; we know of no capitalists who are better entitled to liberal dividends than those who invest in works designed to facilitate communication between distant points, as they make neighbors and friends of strangers; and it is precisely on this account that we advocate a system which we believe has in nine cases out of ten, where adopted, tended directly to increase the receipts and dividends; and hence it is we desire to see the fare reduced between New York, Philadelphia, Baltimore and Washington city, on all of which roads the charges are exorbitantly high when compared with other railroads, and the travel over them.

The charge from New York to Philadelphia $4, Philadelphia to Baltimore $4, and from Baltimore to Washington $2 50, or $10 50 for 234 miles is, in *these* days, on *such* a route, entirely too high, and *must* come down.

It will be said perhaps, that the Camden and Amboy charge only $3 in the morning, to and from Philadelphia, and that by the way of Newcastle and Frenchtown only $2 is charged between Philadelphia and Baltimore; true, and it is because they can *afford* to carry passengers between New York and Philadelphia, and Philadelphia and Baltimore at lower rates and *do not*, only when *obliged* to, that we complain. Their own interest would, as we contend, be ultimately, if not immediately, promoted by adopting lower rates. Of this we have not a shadow of doubt, though we may be in error. We give the annexed, from the Boston Traveller, of 29th July, in support of our position, and shall look with much interest for the regular monthly reports from those roads which have adopted low fares.

*Western Railroad.*—A correspondent furnishes the following statement in relation to the low fare policy and its effects upon this road.

In March and April last, the expediency of reducing the rate of fare on this great line of communication was elaborately discussed in the public prints, and two tickets were run for directors, one of which was styled the low fare ticket. The election having resulted in the choice of a majority of the low fare party, the first and second class rates for through travellers

were reduced in April last from $5 and $3½, to $4 and $2 7/10. The measure has been silently in progress for the last sixty days, and while little gain appears in the way travel as compared with the the corresponding months of last year, an increase of nearly *one hundred per cent.* occured in the number of through travellers, materially augmenting the revenue of the road, although a disproportionate share is paid to the Boston and Worcester railroad company who would not concur in the reduction.

| | |
|---|---|
| Number of through passengers for May, 1843, | 2659½ |
| Number of through passengers for May, 1842, | 1482½ |
| Gain 79½ per cent., | 1177 |
| Number of through passengers for June, 1843, | 3813½ |
| Number of through passengers for June, 1842, | 1866 |
| Gain 105 per cent., | 1947½ |
| Aggregate for May and June, 1843, | 6473 |
| Aggregate for May and June, 1842, | 3348½ |
| Gain 90½ per cent., | 3125½ |

These passengers being way-billed, having no tickets, except for the first stage, and no privilege to stop on the line, except while the train stops, cannot convert their tickets into way tickets.

In addition to the great increase of numbers this measure has given (as predicted) an impulse to the freight, the through freight from Boston to Albany having been trebled in May and June last, as compared with the same months of the preceding year.

We are happy to learn the low fare is succeeding equally well with the way travel on the Worcester railroad, as evinced by the remarkable success of the special train at 2 cents and 1½ cents per mile, between Boston and Newton.

Since the above was written, we learn from the Miners' Journal, of 29th July, that the managers of the Philadelphia and Reading railroad have reduced the fare for through passengers from $3 50 to $2 50.

## RAILROAD ACCIDENTS.

It is much easier to complain of accidents on railroads than to point out the means by which they may *always* be avoided, yet so frequent have they become of late, that it is well worth while to inquire whether some of them at least, are not the result of carelessness, or something less excusable.

But a short time since we cut the following from the Hartford Courant.

"The railroad cars, on Saturday afternoon, were an hour or two behind their usual time. The detention, we understand, was occasioned by a horse which ran along the track, in front of the engine, for several miles, and finally stumbled. The cars passed over him, crushing him of course. The baggage car was thrown from the track, and one of the other cars was somewhat injured. No other injury or loss was occasioned."

An engine-driver who would be guilty of thus jeoparding the lives of his passengers and at the same time of torturing so noble an animal as the horse, deserves instant dismission from employment in a position where he can gratify his mischievous propensities at so great a hazzard to others.

The ink was scarcely dry which recorded the above, when we read of an accident on the Baltimore and Ohio road, from a cow on the track. Fortunately, very little damage was done in this case; it will, however, be exceed-

ingly difficult to avoid a repetition of similar and perhaps fatal accidents on this road, with its numerous short curves, unless measures are adopted to keep cattle off from the track, which *must* be done.

The next on the list of railroad accidents was on the Utica and Schenectady road, which fortunately, was more disastrous to the company in the destruction of engines and cars than to the passengers, who, providentially, escaped without injury. There was not, it appears to us, in this case, due precaution used by the superintendant, in allowing the up train to start until the other train arrived. There should be a rule, invariable, never to send out one train, on a single track, when another is due. Such a rule if never deviated from would insure greater punctuality in starting, which is also important, and should be insisted on by travellers, or rather by the *directors* of the companies.

It was stated in some of the papers that the up passengers were not along —only a few empty cars—when the collision took place, but we have been informed by a gentleman who ought to know, as his wife was in one of the cars, that the passengers were along. The censure in this case should not fall wholly on the managers at Shenectady, but mainly on those at the western termination who disregarded their pledge to start at a given hour, to increase thier passengers, should be held responsible, and made to feel the full force of the public indignation. It is inexcusable thus to trifle with those who travel, and keep hundreds waiting for hours and then risk their lives, that a few more passengers may be taken to-day instead of to-morrow, or perhaps it would be as near the truth to say, be *kept from the packets.*

Another accident occurred on the Philadelphia and Wilmington railroad on Sunday night, 30th July, as it appears from a Baltimore paper, from sheer carelessness, that is, from sending out an extra train upon a single track road, before the other train had arrived. Fortunately, no passengers were injured, yet the engines were destroyed.

The last and sadest recent accident, of which we have now, Aug. 4th, any account, took place on the Reading railroad, and from the information before us, it appears to us, as the Philadelphia Forum says, is wholly attributed to "the carelessness of the agent," who should have detained the up train until the other train arrived.

There must be *system* and *order* and *punctuality* on a railroad with only a *single* track, to avoid accidents, and there should be a more thorough police, until a system of telegraphic signals shall be established, as we hope may soon be the case, on our main lines of railway.

---

RATES OF FREIGHT FROM ALBANY TO BOSTON, 200 MILES.

In *first* class cars, through, $7 per ton, or 3½ cents per ton per mile, for enumerated articles, and $4 per ton, or 2 cents per ton per mile, for other articles in *second* class cars. When in quantities of 6000 lbs. or over, and notice is given before hand that there will be as much as 6000 lbs, a deduction of 20 per cent. is made from the above rates, on certain specified articles.

Flour to Pittsfield, 27 cents; to Springfield, 33 cents; to Worcester, 34

cents, and to Boston 30 cents, it being less trouble to take it through than to leave it on the way.

Live stock, horses and horned cattle, not over four, by special contract. The same, over four, at first class rates. All other live stock will be charged, between

| | | | | |
|---|---|---|---|---|
| Greenbush and Brighton | $8 | per | 2000 | lbs. |
| Pittsfield | " | 7 | " | " |
| Springfield | " | 5 | " | " |

and in proportion from intermediate places.

Sheep and lambs are estimated at 100 and calves at 125 lbs.

Swine in quantities less than 3½ tons, in one consignment, to be charged at 3½ tons; live stock to be fed at the owners cost.

The above abstract, is from the rates established 10th April 1843, a copy of which, together with a copy of the rates for 1842 we request the gentlemen managing the road to forward us; and the managers of each road in the United States are requested to do likewise, that we may show a comparative statement.

---

### GOVERNMENT AID TO RAILROADS.

An important document will be found in this number of the Journal in relation to national aid to railroads, with the view of securing to the government all the advantages of railroads for the transportation of the mails, troops and munitions of war, at low rates and stipulated uniform prices. The subject is one of vast and growing importance, and we consider the present period peculiarly appropriate for the United States government to consummate an arrangement with the numerous railroad companies now in successful operation, which shall be mutually advantageous to both parties and highly important to the government in time of war, for the transportation of men and munitions, and to the *people* at *all* times for the transportation of the mails.

Many companies would be more benefited by receiving a small bonus, which might enable them to liquidate present liabilities and put their road in more complete and efficient order, than by double the amount at a future period; and the government can with great ease accomplish the desired object by the issue of a five per cent. stock, redeemable 30 years hence, during which period the entire amount of the stock would be saved to the government in the reduced cost of transportation; and it would be no compliment to the sagacity of the gentlemen at the head of the different departments, requiring the use of railroads, to suppose they do not perceive that a much more favorable arrangement can now be made than at a later period, when the different companies shall have surmounted their difficulties and completed their roads.

---

### WOODEN COUPLING BARS.

The advantages of this mode of connecting cars have long been known, and yet its use is, as far as we are aware, quite limited, as we have seen

wooden connections used on but few roads. The following is one of many instances that might easily be brought forward in favor of this simple and yet highly useful invention.

"We learn that the passenger cars in the Cumberland train which ran over a cow, on Wednesday night last, were connected to the wood car by *wooden coupling bars*, which broke when the engine went off the track, and the cars were thereby uninjured. This mode of connecting the passenger cars upon the Baltimore and Washington railroads has been in use for some years, and the superiority of the plan is made manifest whenever an accident similar to the above has occurred."—***Balt. Pat.***

---

CANAL TOLLS.

The following statement in relation to the canal tolls, is from the Albany Argus:

"Account of tolls received on all the canals of the State, during

| | 2d week in July. | Total to 14th July. |
|---|---|---|
| 1839, | $32,784 | $681,179 |
| 1840, | 39,512 | 627,807 |
| 1841, | 45,813 | 793,629 |
| 1842, | 35,789 | 666,246 |
| 1843, | 51,038 | 719,570 |

Account of flour and wheat arrived at tide water during

| | 2d week in July. | | Total to 14th July. | |
|---|---|---|---|---|
| | Flour, barrels. | Wheat, bushels. | Flour, barrels. | Wheat, bushels. |
| 1842, | 30,154 | 7,059 | 481,865 | 176,757 |
| 1843, | 72,344 | 15,242 | 558,931 | 147,421 |

Amount of tolls received at Albany on the Erie and Champlain canals:

| | 1842. | | 1843. | | |
|---|---|---|---|---|---|
| April, | $14,326 07 | | | | |
| May, | 46,766 43 | | 60,646 27 | | |
| June, | 23,688 27 | | 26,311 47 | | |
| July, | 23,292 13 | 98,072 90 | 25,249 47 | 112,207 21 | |
| | | | | 98,072 90 | |
| Increase to 31st July, | | | | $14,124 31 | |

Account of tolls received on all the canals of this State, and of the lockages at Alexander's lock, three miles west of Schenectady, to the 1st Aug.:

| | Tolls. | Passages at Alexander's lock. | |
|---|---|---|---|
| 1839, | $761,423 | 10,646 | |
| 1840, | 716,526 | 11,555 | |
| 1841, | 912,224 | 13,486 | |
| 1842, | 750,951 | 10,090 | |
| 1843, | 858,485 | 9,668 | |
| The increase over last year is | | | $109,534 |
| Of this increase there is at Buffalo | | 68,459 | |
| " " | West Troy | 28,424 | |
| " " | Albany | 6,368 | 103,251 |
| Leaving for increase at all other offices, | | | $4,283 |

The $103,251 represents the increase of produce from, and merchandize to, western States, by the way of Buffalo. The $4,283 represents the increase over last year in the *home business*, or business of this State."

RAILROADS IN MICHIGAN.

We learn from the Detroit Free Press, though *we do not receive it*, but should like to, that there is now in successful operation in Michigan, 147 miles of railroad, as follows:

| | | |
|---|---|---|
| "From Detroit to Jackson, | 80 | miles, |
| " Monroe to Hudson, | 42 | " |
| " Detroit to Pontiac, | 25—147 | " |

The cars will soon run 40 miles further on the Central road—from Jackson to Marshall, and 16 miles further on the southern road, from Hudson to Hillsdale, which will then give us 203 miles of railroad. We think this pretty fair for the youngest State in the Union."

So do we, and give the young State of Michigan full credit for her enterprize, and hope to see her persevere in her onward course which will certainly place her in an enviable position in a few years—especially if she *repudiates* that infamous doctrine of "repudiation."

---

*Boston and Worcester Railroad.*—We learn from the Boston Mercantile Journal that the second track upon this railroad is completed through its entire length from Boston to Worcester, and is now opened for use. We hope now to hear soon that the directors have also adopted lower rates of fare, so as not to throw the entire reduction made between Albany and Boston upon a part of the route.

We learn that the Mohawk and Hudson railroad company have effected a loan from the city of Albany of $150,000 at 5 per cent. With this money the company are to construct a new route of their road, which will terminate within the city limits, and will dispense with the inclined plane, now in use at the eastern termination. This change of route on the Mohawk road will be a great convenience to travellers. The inclined plane at Schenectady has been, or is about to be, dispensed with by adopting a new route. We should like to see a full statement of the actual cost of this road, from its commencement. It would show what experience sometimes costs. It should, however, be borne in mind that this road was commenced when inclined, planes and locomotives to run on 33 freet grades, and haul 20 tons on a *level* road at the rate of 10 miles an hour were the order of the day, and considered great performances.

The Brownsville (Penn.) News, says that out of a drove of 700 sheep which stopped at Beallsville, Washington Co., Pa., after one days drive 405 were found dead next morning, from having been over driven. This would not have occurred on a railroad.

Paterson railroad fare reduced from 37½ to 25 cents. Good.

---

*Railroad Reports* received since our last and will be noticed in our next number. South Carolina Canal and Railroad company, July, 1843. Georgia Railroad and Banking company, May, 1842 and 1843.

*Rates of Fare and Freight* received since our last and will be noticed

in the next number. A tariff of Freights and Passage on the South Carolina Hamburg and Columbia railroads; and on the Georgia railroad between Augusta and Madison; an abstract of which, we shall give in the October number. Will the managers of *other* roads please furnish us with a copy of their established rates? We design to make a table showing the rates comparatively, on all the railroads in the United States, if we can obtain them.

*Otis' Excavator*, of which an interesting description is given in this number, are to be used extensively on the St. Petersburg and Moscow railroad, in Russia. One machine was sent out last year, and three more, just completed by Eastwick and Harrison, Philadelphia, are now ready for shipment; and we understand that the owners of the patent, Messrs. Fairbanks and Carmichael, have taken a contract for the excavation of 25,000,000 cubic yards on this road.

*Spring Steel for Locomotives, Tenders and Cars.*—We desire to call the attention of manufacturers and others interested, to the following advertisement of J. F. Winslow, Esq., of the *Albany Iron and Nail Works*, at Troy, of *Spring Steel.* Mr. Winslow is, we believe, quite extensively engaged in the manufacture of steel, and from what we have seen and heard we believe he furnishes an excellent article.

SPRING STEEL, FOR LOCOMOTIVES, TENDERS AND CARS.

THE subscriber is engaged in manufacturing Spring Steel from 1¼ to 6 inches in width, and of any thickness required: large quantities are yearly furnished for Railroad purposes, and wherever used, its quality has been approved of. The establishment being large, can execute orders with great promptitude, at reasonable prices, and the quality *warranted.*

Address JNO. F. WINSLOW, Agent.
*Albany Iron and Nail Works,*
*Troy, July*, 1843. *Troy, N. Y.*

☞ Thanks to those subscribers who have so promptly responded to our call upon them. If each present subscriber will do as some have already done—send two new names and cash with their own payment, in advance—the Journal will not be likely to lose time again soon.

☞ Thanks also to those Editors who have, in so kind a manner, noticed the Journal, and offered to receive subscriptions to it. As it is the only work of the kind published in this country, devoted mainly to Internal Improvements, in which all classes of people, and all parts of the country, have a deep interest, we shall be greatly indebted to all who will call attention to it as it appears, monthly, and send us, those who do not now, theirs in exchange. The Journal has been sent to Editors without the cover, in order to save them postage, and thus the whereabouts of its publication was omitted. It was presumed, however, that every Editor in the country, who had been long in the chair, knew where the Railroad Journal was, or had been published.

## CONTENTS:


| | Page. | | Page. |
|---|---|---|---|
| South Carolina canal and railroad report, | 257 | Great performance of a locomotive engine, | 280 |
| Otis' patent excavator, | 260 | Progress of the doctrine of low fares, | 281 |
| Railway speed and safety, | 266 | Railroad accidents, | 283 |
| Revolving steamer, | 266 | Rates of freight from Albany to Boston, | 284 |
| Electro Magnetic telegraph, | 267 | Government aid to railroads, | 285 |
| Ballooning the Atlantic, | 267 | Wooden coupling bars, | 285 |
| Kite's patent safety beam, | 267 | Canal tolls, | 286 |
| Notes on practical engineering. No. 1, | 268 | Railroads in Michigan, | 287 |
| Practical remarks on blast furnaces, | 271 | Editorial notices, | 287, 288 |
| Reading railroad and the coal trade, | 274 | Advertisement—spring steel, | 288 |
| Government aid to railways, | 275 | Contents. | 288 |